IPRL Offshoots

USDA-ARS Invasive Plant Research Laboratory
3205 College Ave., Fort Lauderdale, Fl 33314

January 2004

Upcoming Events

Weed Science 2004 - Weed Science Society of America Annual Meeting
February 9-12, 2004
Westin Crown Center
Kansas City, Missouri
www.wssa.net

27th Annual Florida Weed Science Society Conference and Meeting
February 24-25, 2004
University of Florida Indian River Research and Education Center
Fort Pierce, Florida

55th ANNUAL MEETING of the American Institute of Biological Sciences
"Invasive Species: The Search For Solutions"
March 16-18, 2004
Westin Grand Hotel
Washington, DC
www.aibs.org

Plant Biologists of South Florida Meeting
April 3, 2004
Big Cypress National Preserve, Florida
www.nps.gov/bicy/pphtml/planyourvisit.html

More upcoming events on last page

Welcome to the inaugural edition of *Offshoots*, recipients of which share a common interest in invasive plants and how to deal with them.

The IPRL, or Invasive Plant Research Laboratory, is a unit of the U.S. Department of Agriculture's Agricultural Research Service. The lab is not only active in researching aquatic and upland weeds, it is also dedicated to creating and refining practical applications for solving invasive plant problems.

The purpose of this report is to let you know what is going on at the IPRL. For example, you might not be aware that there is a new quarantine facility at the IPRL that is scheduled to open in early 2004. Our plan is to publish this report as needed, with topics of interest to scientists, land managers, land owners, home owners, and students about research, recent accomplishments, new biological control agents, upcoming field tours, status of demonstration sites, and more.

John Scoles
IPRL Offshoots Editor

Research of local USDA/ARS scientists highlighted at recent international conference on invasive species.

by John Scoles

Land managers, conservation groups, and scientists had an opportunity to share research results and ideas on invasive plant ecology and management at an internationally attended conference in Fort Lauderdale, Florida. A host of federal and state agencies and nonprofit associations, including the National Association of Exotic Plant Pest Councils, cosponsored the joint conference. The two conferences involved were the Invasive Plants in Natural and Managed Systems and the 7th International Conference on the Ecology and Management of Alien Plant Invasions. The meeting was held at the Wyndham Bonaventure resort in Fort Lauderdale, November 3rd - 7th, 2003.

Scientists, technicians, graduate students, and interns from the Invasive Plant Research Laboratory (IPRL) in Fort Lauderdale were actively involved in the conference. The IPRL is a unit of the Agricultural Research Service (ARS), the main in-house research arm of the U.S. Department of Agriculture (USDA). Having the conference venue in the Fort Lauderdale area gave the local scientists the opportunity to share their research first-hand. Scientists were also able to educate conference attendees from around the globe on the use of biological control as a means of managing invasive plants.

Biological control poses a complex set of management and research challenges. A complete biological control program must include careful selection of target plants and biological control agents. Scientists at the IPRL are involved in all aspects of biological control, and several of them shared their perspectives and ideas at the conference.

Invasive Plant Management Challenges

An inter-agency, integrated management program conducted on an area-wide basis is superior to unplanned and uncoordinated control efforts. This was the subject addressed by IPRL Research Leader and entomologist, Dr. Ted Center, in his presentation on "The role of biocontrol in integrated weed management." Dr. Center drew on two examples of control strategies involving water hyacinth (*Eichhornia crassipes*) and melaleuca (*Melaleuca quinquenervia*). An integrated control plan for the water hyacinth project was never developed whereas an inter-agency developed plan was created for melaleuca. Dr. Center's contrasting of the two projects clearly indicated that using an integrated management plan was superior to the unplanned method tried on water hyacinth. Comparing these two strategies demonstrates the utility of a well planned management program that capitalizes on the strengths of each type of control tactic.

One of the greatest concerns of practitioners is the potential for biological control agents to damage species of agricultural or horticultural value or native species.

Dr. Robert Pemberton, research entomologist, discussed the safety and host specificity of biological control agents in a talk entitled "Biological control of weeds safety within temporal and cultural contexts." Dr. Pemberton analyzed data on biological control agent introductions in the Continental US, Hawaii and the Caribbean between 1902 and 1994. His research suggests that before 1980 biological control science functioned well to prevent harm to agricultural plants but did not consider the affects on native plants.

"Having the conference venue in the Fort Lauderdale area gave the local scientists the opportunity to share their research first-hand."

Greater consideration of potential risk to native plants in biological control was stimulated by heightened interest in native plants in the United States during the 1970s and 1980s. As a result, biological control agent introduction practices were modified to better consider risks to native plants. What constitutes acceptable risk to native plants, however, varies among countries, states and interest groups. This can lead to demands for unwise introductions by the sectors most affected by the weeds. It can also lead to introductions of biological control agents in one country deemed too risky for use in adjacent countries. According to Dr. Pemberton, risk to native plants needs to be considered more strongly from bioregional perspectives. He believes we must also consider risk to

native and economic plants within the contexts of the threats posed by invasive plants and the utility of other control options.

Biological Control Research Findings

For biological control efforts to be safe and effective, it is necessary to understand the ecology of invasive species at many levels, from genes to ecosystems. IPRL scientists conduct research that contributes to our knowledge of weed ecology at different scales.

Dr. F. Allen Dray presented research on "Ecological genetics of *Melaleuca quinquenervia*: Population variation and its influence on *Oxyops vitiosa* performance." His research indicates that melaleuca was introduced at least six separate times in south Florida. It shows that these introductions resulted in current populations of melaleuca with distinct geographic patterns in genetic diversity and their production of essential oils. Plants with one type of essential oil are preferred by *Oxyops vitiosa* (the melaleuca weevil), according to the results presented by Dr. Greg Wheeler. Those same plants also enhance the performance of the weevil. This difference in preference and performance has important implications for matching the appropriate biological control agents with target plants.

Dr. Steve Franks, a plant ecologist with the IPRL, demonstrated variation in melaleuca genotypes and traits. Dr. Franks allowed biological control agents to feed on melaleuca seedlings of a known maternal source. The results of this experiment showed that the biological controls agents preferred feeding on plants from the introduced range over plant from the home range. Less herbivory resistance would be expected in the new range where natural enemies were absent and resistance traits might spread through the invasive populations reducing the effectiveness of biological control. However, research indicates that there is little evidence at this time that this is a serious concern for melaleuca management.

Giving further support for the effectiveness of biological control agents in reducing plant performance and population growth of melaleuca, Dr. Paul Pratt showed that the melaleuca weevil reduced melaleuca flowering. Dr. Pratt's research demonstrated that trees incurring four consecutive years of weevil damage had a lower probability of flowering across the entire range of tree sizes evaluated. In a separate experiment, attacks by the melaleuca weevil resulted in an 80 percent reduction in the number of flowers produced per tree. Dr. Pratt's data suggest that trees attacked by the biological control agent are 36 times less likely to produce flowers than trees that are not attacked by the melaleuca weevil.

Dr.Ted Center (third from right) leads conference attendees on a tour of the IPRL quarantine facility.

Dr. Phil Tipping showed the effectiveness of biological control on a different species, the floating aquatic plant *Salvinia molesta* (giant salvinia). The weevil *Cyrtobagous salviniae* was released in an effort to control salvinia in Texas and Louisiana in June 1999. Releases were not made again until October 2001 but substantial damage to salvinia is now evident at most release sites. Also, the damage appears to be

spreading out from the release points. The weevils have successfully established and have significantly reduced coverage and biomass of giant salvinia at several sites. Sites where weevils were not released remain choked with salvinia. At one site in Louisiana, giant salvinia was virtually eliminated from the biological testing area in a pond. Another larger site in Texas has seen a reduction in coverage and biomass of almost 90% and the trend is continuing. The well documented evidence for successful control is so conclusive that releases are now being conducted at the control sites. USDA-ARS has released *C. salviniae* in other areas in order to increase the rate of control for this weed throughout its adventive range. The United States now joins the list of other countries that have successfully used biological control to suppress giant salvinia.

Dr. Paul Pratt (left) leads conference attendees on a tour of the Everglades.

Site Visits

Conference attendees were given four opportunities to tour the facilities and research efforts of the Invasive Plant Research Laboratory in Fort Lauderdale. The main purpose of the tours was to demonstrate the progress being made using biological control agents. IPRL scientists participated in the tours and provided status reports on the various biological control programs.

Prior to the start of the conference, Dr. Robert Pemberton led a tour group to see populations of lobate lac scale, a recent invader in south Florida. Populations of this pest are on the rise in many natural areas of southeastern Florida. Infestations have resulted in dieback and in some cases death of native plants including, wax myrtle, myrsine, and red bay. Dr. Pemberton also discussed the development of a biological control program for this new pest.

Dr. Center hosted two tours of the IPRL grounds and its nearly completed quarantine facility, one for the Nature Conservancy meeting attendees and one for interested conference attendees. The IPRL was established to develop sustainable methods to manage invasive exotic plants based primarily on biological and integrated control technologies. Tour participants were able to walk the halls of the quarantine facility prior to its going into operation. Once the quarantine is operating, visitors will only be able to view the quarantine through glass. With a total staff of more than 30, IPRL researchers are developing biological control programs for many of Florida's worst invasive plants. The program, so far, has developed 13 biological control insects for use against five invasive plants, and is continuing to develop biological control agents for several other species.

Dr. Pratt conducted an additional tour of the IPRL grounds and new quarantine facility. Attendees were given the opportunity to see biological control agents first hand and observe their impact on melaleuca growth and development. The tour also highlighted research conducted by Drs. Pratt and Tipping that demonstrates the environmental safety of introduced biological control agents and their failure to adopt native plants. The tour continued at a demonstration site along the Everglades buffer strip near Holiday Park, Florida. Attendees were able to examine the

Picture of the Month

Melaleuca Weevils enjoying Thanksgiving dinner.

destruction caused by the melaleuca weevil and melaleuca psyllid. Attendees slogged through dense, nearly monospecific, melaleuca stands where Dr. Pratt highlighted the immense litter accumulation and associated displacement of native flora and fauna. Dr. Pratt's tour concluded with an airboat tour of the Everglades to examine invasive aquatic weeds.

The use of biological control agents along with conventional control methods (cutting, pulling, burning, spraying, and so on) to manage pest plants has proven the most effective way to provide long term management.

Websites You May Want to Visit

To learn more about invasive plants and what various organizations are doing about them visit the following sites on the internet.

Agricultural Research Service
www.ars.usda.gov/

Center for Exotic and Invasive Plants
aquatl.ifas.ufl.edu

Federal Noxious Weed Program
www.aphis.usda.gov/ppq/weeds

Florida Department of Agriculture, Department of Plant Industry
www.doacs.state.fl.us/~pi/index.html

Florida Department of Environmental Protection, Bureau of Invasive Plant Management
www.dep.state.fl.us/lands/invaspec/

Florida Exotic Pest Plant Council
www.fleppc.org

Invasive Plant Research Laboratory
www.weedbiocontrol.org/

The National Agricultural Library's Invasive Species website
www.invasivespecies.gov

National Noxious Weed Program
http://dogwood.itc.nrcs.usda.gov/weeds

Southwest Florida Water Management District
www.swfwmd.state.fl.us/

TAME Melaleuca Project
http://tame.ifas.ufl.edu

The Nature Conservancy
http://nature.org/

TAME Melaleuca Project

In 2001 the USDA's Agricultural Research Service (ARS) created the TAME Melaleuca project to continue promoting melaleuca management on public and private lands, and to demonstrate effective inclusion of biological control in management strategies. In cooperation with numerous land owners and land managers in southern Florida TAME is demonstrating how to incorporate biological control into conventional control methods on 235 acres of land. The sites are widely distributed across southern Florida to facilitate access to a variety of audiences.

1. Lake Worth Site (Lake Worth, Palm Beach County). A two acre residential lot with a small nursery business owned and managed by Pamela Crawford. The site contains mostly mature melaleuca trees.

2. Prairie Pines Site (Lee County). Forty acres owned and managed by the Lee County Parks and Recreation consisting of a combination of mature, seedling, and sapling melaleuca.

3.Corkscrew Swamp Sanctuary Site (Collier County). Seven acres total, one acre owned and managed by the Audubon Society's Corkscrew Swamp Sanctuary and six acres owned and inhabited by private citizens. It contains a combination of mature and dense sapling melaleuca. This site works well for homeowner outreach.

4. Clewiston Site (Glades County). Sixteen acres owned and managed by the US Sugar Corporation containing mature melaleuca forest.

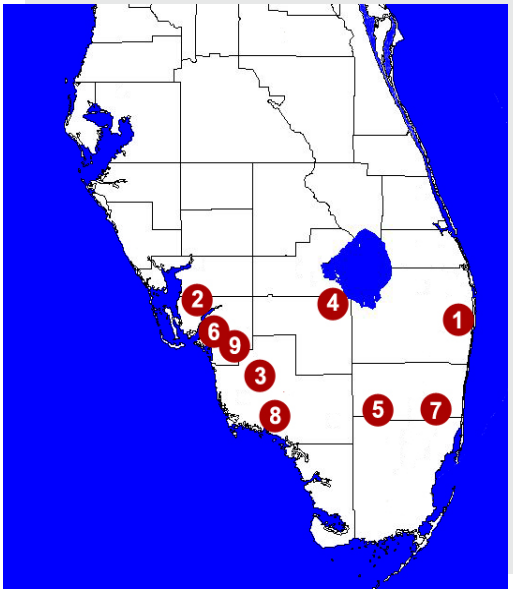
5. Everglades Buffer Strip Site (Broward County). Sixty acres owned and managed by the South Florida Water Management District containing mature melaleuca forest.

6. Fort Myers Site (Lee County, near Fort Myers airport). Twenty acres owned by the Frankel Group and managed by Paul Jacobs consisting of a cow pasture that is mowed periodically . Melaleuca is regrowth from mowed stumps.

7. Fort Lauderdale Site (Broward County). Five acres owned by the University of Florida and managed by USDA-ARS IPRL used as a demonstration and research site for a variety of studies on the impacts of biological control agents on melaleuca and the safety of using biological control agents around non-targeted plants.

8. Belle Meade Site (Collier County). Forty acres owned and managed by Florida Division of Forestry and used as a demonstration and research site for evaluating impacts of biological control agents on seedling recruitment and stump regrowth.

9. Lee County Well Field Site Forty-five acres owned and managed by Lee County Utilities used as demonstration and research site for evaluating impacts of biological control agents on melaleuca stump regrowth.



TAME Melaleuca project demonstration site locations

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More upcoming events

65th Annual Meeting of the Association of Southeastern Biologists
April 14-17, 2004
University of Memphis, Fogelman Executive Center
Memphis, Tennessee
www.people.memphis.edu/~biology/asb/

Florida Exotic Pest Plant Council 20th Annual Symposium and Southeast Exotic Pest Plant Council 6th Annual Symposium
April 28-30, 2004
Clarion Suites and Convention Center
Pensacola Beach, Florida
Deadline for papers/posters
January 30, 2004
www.fleppc.org/

Aquatic Weed Control Short Course 2004
May 3-7, 2004
Fort Lauderdale, Florida
http://conference.ifas.ufl.edu/aw/

2nd Latin-American Short Course on Biological Control Weeds
June 7-10, 2004
Barcelo Hotel
Montelimar, Nicaragua

44th Annual Meeting of the Aquatic Plant Management Society
July 11-14, 2004
Tampa, Florida
www.apms.org

89th Annual Meeting of the Ecological Society of America
August 1-6, 2004
Portland, Oregon
www.esa.org/portland/

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